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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,537	09/30/2003	Richard D. Harris	02AB061	6085

7590 05/25/2006

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EXAMINER	
AMRANY, ADI	

ART UNIT	PAPER NUMBER
2836	

DATE MAILED: 05/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/675,537	HARRIS ET AL.	
	Examiner	Art Unit	
	Adi Amrany	2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-55* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-55* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because the reference numeral 49, which designates the transverse outer ends 49 of the transverse arm 14, is not shown in figure 4 (page 15, line 4).

2. The drawings are further objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the array of electrical generators connected in series, as recited in claim 55, must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The specification is objected to because of the following informalities: Page 9, lines 4-5; the numeral 12 may be used to designate both first beam and a second beam only if the designated beams are identical. An example of such a configuration is provided in figure 1, item 36, which is used to designate two different, but identical, pylons. Applicants are requested to remove the bracketed sentence.

Claim Objections

4. Claims 13-17, 18, 21, 26-27, 30, and 34-55 are objected to due to lack of antecedent basis.

With respect to claim 13, there is no basis for the limitation of "the beam" recited in claim 13. Independent claim 1 recites the limitation of an insulating power transfer structure. Claim 2 recites that the structure comprises a beam. Claim 3, however, is dependent on claim 1.

Claims 14-17 are objected to because they depend on claim 13.

With respect to claim 18, it is objected to because there is no antecedent basis for the recited limitation of the substrate. The specification discloses that the MEM structure is configured on a substrate, but there is no such limitation recited in claim 1, upon which claim 18 depends.

With respect to claims 21 and 30, there is no antecedent basis for the term "source." For the purposes of the art rejection of claims 21 and 30, the term will be replaced with "source generator."

With respect to claims 26 and 27, there is no antecedent basis for the term "power-producing elements" in independent claim 22. For the purposes of the art rejection of claims 26 and 27, this term will be interpreted as the "electrical generator."

With respect to claim 34, there is no antecedent basis for the term "the force generator" (line 6). Claim 34 recited a *first* generator (line 3).

Claims 35-55 are objected to because they depend on claim 34.

With respect to claims 35, 43-44, 48, and 51-52, they are objected to because there is no antecedent basis for the term "source generator." Independent claim 34 recites a *first* generator and an *electrical* generator. For the purposes of the art rejection of dependent claims 35-55, the limitation of the source generator will be replaced with "first generator."

With respect to claim 44, it is objected to because there is no antecedent basis for the term "beam." Independent claim 34 recited an insulated power transfer structure. The "beam" was not recited until dependent claim 35.

Claims 45-47 are objected to because they depend on claim 44.

With respect to claims 53-54, there is no antecedent basis for the term "the generator." Claim 34 recited a *first* generator and an *electrical* generator, as discussed above. Claims 53 and 54 do not disclose which generator is the subject of the

dependent claims. For the purposed of the art rejection of claims 53 and 54, it is interpreted that applicants intended to recite "first generator."

With respect to claim 55, there is no recitation of which element further comprises the series array. For the purpose of the art rejection of claim 55, it will be interpreted as "wherein the first generator further comprises..."

5. Claim 55 is objected to because the specification does not provide support for the claimed limitation. The specification does not disclose an embodiment where the device comprises an array of electrical generators connected in series. The specification (figure 11, paragraph 39) only discloses an array of electrical generators connected in parallel.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 4-6, 10-12, 24, 29, 37-39, and 44-47 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not disclose how the magnetic field 39 is disposed about the conducting loops (page 7, lines 14-16). The specification does not disclose the

source of the field, how the field is controlled, and if/how the two magnetic fields (at the first and second ends of the beam) are isolated from each other. Applicants do not disclose how a change in the magnetic field on one side of the beam (due to varying currents passed through it) does not affect the magnetic field on the second side (at the load).

The drawings label the magnetic field 39 as an X contained within a circle, which represents the direction of magnetic flux passing into the plane of the drawing. Applicants define the "right hand rule" (page 15, lines 10-12), but then do not provide a description of how an AC signal and an existing magnetic field react to provide the force. It is known that a current in a loop generates a magnetic field and a magnetic field can create current, but applicants do not disclose how these forces act in combination to provide the claimed results.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-3, 22-23, 34-36, 48-49, and 52 are rejected under 35 U.S.C. 102(b) as being anticipated by Mihailovich (US 6,417,743).

With respect to claim 1, Mihailovich discloses an electrically isolated power transfer MEMs device (figure 1; column 3, line 66 to column 4, line 1) for delivering electric power to a load, the device comprising:

a source generator (figure 2, items 24, 32; column 4, lines 56-59) including a movable member (figure 2, item 24), wherein the source generator converts an electrical input signal to a displacement of the movable member;

a power transfer structure (figure 2, item 26; column 4, lines 47-55 and line 66 to column 5, line 2) defining an input end in communication with the movable member that receives the displacement, and an output end, opposite the input end that communicates the displacement, wherein at least a portion of the power transfer structure between the input and output ends in insulating (column 4, lines 2-4; column 5, lines 4-7);

an electrical generator (figure 2, item 36; column 4, lines 63-65) disposed at a second end of the device receiving the displacement from the output end of the power transfer structure (figure 2, item 28) and, in response to the displacement, generates electrical power that is delivered to the load (column 5, lines 2-4).

It should be noted that the detector circuit disclosed in Mihailovich at column 5, lines 2-3, is incorrectly labeled 34. It should read 36.

With respect to claim 2, Mihailovich discloses the device as recited in claim 2, and further discloses the insulated power transfer structure further comprises an elongated beam (figure 3, item 26) disposed between the source generator and the

electrical generator. Mihailovich discloses (figure 3) that the power transfer structure is a "beam" comprising an elongated structure having one dimension longer than the other.

With respect to claim 3, Mihailovich discloses the device as recited in claim 2, wherein the beam moves in response to the output of the source generator (column 4, lines 66-67).

With respect to claim 22, Mihailovich discloses the apparatus that is used to complete the claimed method steps. The apparatus disclosed by Mihailovich, as discussed above in the rejections of claim 1-3, anticipate the method of claim 22.

With respect to claim 23, Mihailovich discloses the method as recited in claim 22, and further discloses the power transfer structure further comprises a movable beam (column 4, lines 66-67) that moves in response to actuation of the power transfer structure, as discussed above.

With respect to claim 34, Mihailovich discloses an electrically isolated power transfer MEMS device (figure 2) for delivering electric power to a load, the device comprising:

a first generator (figure 2, items 32 and Cd; column 4, lines 56-59) disposed at a first end of the device that is capable of producing an output in response to a force;

an electrical generator (figure 2, items Cc and 36; column 4, lines 63-65) disposed at a second end of the device receiving the output from the *first*

generator and, in response to the output, is actuated to generate electrical power that is delivered to the load;

and an insulated power transfer structure (figure 2, item 10; column 4, lines 2-4 and line 66 to column 5, line 7) disposed between the first generator and electrical generator that communicates the output of *the* first generator to the electrical generator, thereby actuating the electrical generator.

With respect to claim 35, Mihailovich discloses the device as recited in claim 34, and further discloses the insulated power transfer structure comprises an insulated elongated beam (figure 3, item 26) disposed between the *first* generator and the electrical generator.

With respect to claim 36, Mihailovich discloses the device as recited in claim 35, and further discloses the beam moves in response to the output of the *first* generator (column 4, lines 66-67).

With respect to claim 48, Mihailovich discloses the device as recited in claim 34, and further discloses the *first* generator comprises an electrostatic generator having a set of capacitor plates (figure 2, item Cd) including at least one movable plate (figure 2, item 24) that is in mechanical communication with the beam (column 4, lines 47-51).

With respect to claim 49, Mihailovich discloses the device as recited in claim 48, and further discloses the capacitor plates receive electrical power from a source that is selected from the group consisting of: an ac source and a dc source (column 3, lines 10-12).

With respect to claim 52, Mihailovich discloses the device as recited in claim 34, and further discloses the *first* generator receives the force and converts the force to an output displacement (column 4, lines 17-27). Mihailovich discloses that the device may be placed between an existing noisy field environment and a load. In this instance, the device disclosed in Mihailovich is not creating the force, but receiving and converting an existing force.

9. Claims 1-4, 7, 10, 20-25, 28-30, 34-37, 40, 43-44, 51, and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Herbert (US 2002/0070723).

With respect to claim 1, Herbert discloses an electrically isolated power transfer MEMs device (figure 2; paragraph 46, lines 1-5) for delivering electric power to a load, the device comprising:

a source generator (figure 2, items 14, 22; paragraph 46, lines 5-9) including a movable member (figure 2, item 14), wherein the source generator converts an electrical input signal to a displacement of the movable member;

a power transfer structure (figure 2, item 12; paragraph 44) defining an input end in communication with the movable member that receives the displacement, and an output end, opposite the input end that communicates the displacement, wherein at least a portion of the power transfer structure between the input and output ends is insulating (figure 2, items 28 and 30; paragraph 46, lines 1-5);

an electrical generator (figure 2, item 24; paragraph 47, lines 1-5) disposed at a second end of the device receiving the displacement from the output end of the power transfer structure (figure 2, item 12b) and, in response to the displacement, generates electrical power that is delivered to the load.

The Herbert MEMS device is an electrical isolator (paragraph 4, lines 1-3). Therefor, it is inherent that the device is designed to reproduce an electrical signal at the output (sensor, item 24). The output electrical signal created by the capacitor banks (figure 2, items 36a and 36b) is sensed at terminals (figure 2, items 38a and 38b), and the output electrical signal is then supplied to the load.

With respect to claim 2, Herbert discloses the device as recited in claim 2, and further discloses the insulated power transfer structure further comprises an elongated beam (figure 2, item 12; paragraph 44) disposed between the source generator and the electrical generator.

With respect to claim 3, Herbert discloses the device as recited in claim 1, and further discloses that the beam moves in response to the output of the source generator (paragraph 46, lines 5-9).

With respect to claim 4, Herbert discloses the device as recited in claim 3 and further discloses the electrical generator comprises an electrical loop having movable conductive arm in mechanical communication with the beam, wherein movement of the beam deflects the arm in the presence of a magnetic field to change the loop area and generate power for the load (paragraph 45, lines 8-11, "inductive sensor"). The inductive sensor deconstructs the physical motion of the beam created by the Lorentz

force motor into an electrical current, where the arm (figure 2, item 16) is deflected in the presence of a magnetic field (figure 2, item 32).

With respect to claim 7, Herbert discloses the device as recited in claim 3, and further discloses the electrical generator comprises a piezoelectric material (paragraph 45, lines 8-11, "piezoelectric sensor") that is in mechanical communication with the beam, and wherein beam movement produces a force against the piezoelectric material to generate a voltage that is applied to the load. The mechanical communication and force transfer of the beam and electrical generator were discussed in the rejection of claim 1, above.

With respect to claim 10, Herbert discloses the device as recited in claim 1, and further discloses the source generator comprises a Lorentz actuator (paragraph 45, lines 5-8, "Lorentz motor") including a movable arm (figure 2, item 14) in mechanical communication with the beam, wherein electrical current is supplied to the arm in the presence of a magnetic field to generate a force that displaces the movable member (paragraph 46, lines 5-9).

With respect to claim 20, Herbert discloses the device as recited in claim 1, and further discloses the power transfer structure oscillates during operation, further comprising compensation elements (figures 3 and 5; paragraphs 51-52 and 67) to maintain the oscillation of the power transfer structure at a resonant frequency.

Herbert discloses compensation elements (24') that are operated to change the resonant frequency of the power transfer structure. Therefor, it is inherent that the power transfer structure oscillates at its resonant frequency. Further, since the

disclosed compensation elements maintain a resonant frequency, it is inherent that the power transfer structure oscillates.

With respect to claim 21, Herbert discloses the device as recited in claim 1, and further discloses the source *generator* further comprises a bi-morph (paragraph 45, lines 5-8, "thermal-expansion motor"). A bi-morph is an actuator that is composed of two different materials, such that one elongates more than the other on the application of a stimulant, which in the applicants' specification, is heat (page 16, lines 10-13). It is inherent that thermal-expansion motor operates under the same principles of heat application.

With respect to claims 22-25, and 29, Herbert discloses the apparatus that is necessary to complete the claimed method steps. The apparatus disclosed by Herbert is discussed above in the §102(b) rejections of claims 1-4, 7, and 10, and below in the rejections of claims 34-37, 40, and 44.

With respect to claim 28, Herbert discloses the method as recited in claim 22, and further discloses the apparatus necessary to complete the method of the present claim, as discussed below in the rejection of claim 43. Herbert anticipates the limitation of a mass in mechanical communication with the power transfer structure.

With respect to claim 30, Herbert discloses the apparatus necessary to complete the method as recited in claim 22, and further discloses the source *generator* receives the electrical current from one of a piezoelectric actuator and a thermal actuator (paragraph 45, lines 5-8).

With respect to claim 34, Herbert discloses an electrically isolated power transfer MEMS device (figure 2) for delivering electric power to a load, the device comprising:

a first generator (figure 2, item 22; paragraph 46, lines 5-9) disposed at a first end of the device that is capable of producing an output in response to a force;

an electrical generator (figure 2, item 24; paragraph 47, lines 1-5) disposed at a second end of the device receiving the output from the *first* generator and, in response to the output, is actuated to generate electrical power that is delivered to the load;

and an insulated power transfer structure (figure 2, items 12, 28 and 30; paragraph 44, lines 8-10; paragraph 46, lines 1-5) disposed between the first generator and electrical generator that communicates the output of *the* first generator to the electrical generator, thereby actuating the electrical generator.

With respect to claim 35, Herbert discloses the device as recited in claim 34, and further discloses the insulated power transfer structure comprises an insulated elongated beam (figure 2, item 12; paragraph 44) disposed between the *first* generator and the electrical generator.

With respect to claim 36, Herbert discloses the device as recited in claim 35, and further discloses the beam moves in response to the output of the *first* generator (paragraph 46, lines 5-9).

With respect to claim 37, Herbert discloses the device as recited in claim 36, as discussed above, and further discloses the electrical generator comprises an electrical

loop having movable conductive arm in mechanical communication with the beam, wherein movement of the beam deflects the arm in the presence of a magnetic field to change the loop area and generate power for the load (paragraph 45, lines 8-11, "inductive sensor"). The inductive sensor deconstructs the physical motion of the beam created by the Lorentz force motor into an electrical current, where the arm (figure 2, item 16) is deflected in the presence of a magnetic field (figure 2, item 32).

With respect to claim 40, Herbert discloses the device as recited in claim 36, and further discloses the electrical generator comprises a piezoelectric material (paragraph 45, lines 8-11, "piezoelectric sensor") that is in mechanical communication with the beam, and wherein beam movement produces a force against the piezoelectric material to generate a voltage that is applied to the load. The mechanical communication and force transfer of the beam and electrical generator are discussed above.

With respect to claim 43, Herbert discloses the device as recited in claim 34, and further discloses the *first* generator comprises a mass in mechanical communication with the power transfer structure, and wherein vibration of the MEMS device actuates the mass to provide a displacement output (paragraph 45, lines 5-8, "mechanical-displacement motor"). It is inherent that a mechanical-displacement motor would displace a mass in order to create the inertia to convert to power.

With respect to claim 44, Herbert discloses the device as recited in claim 34, and further discloses the *first* generator comprises a Lorentz actuator (paragraph 45, lines 5-8, "Lorentz motor") including a movable arm (figure 2, item 14) in mechanical communication with the beam, wherein electrical current is supplied to the arm in the

presence of a magnetic field to generate a force that is applied to the beam (paragraph 46, lines 5-9).

With respect to claim 51, Herbert discloses the device as recited in claim 34, and further discloses the *first* generator further comprises a piezoelectric member (paragraph 45, lines 8-11, "piezoelectric sensor") that receives an electrical input and provides the force that generates a displacement output.

With respect to claim 53, Herbert discloses the device as recited in claim 34, and further discloses the *source* generator produces the force and converts the force to an output displacement (paragraph 45, lines 5-8). Herbert discloses that the source generator may be selected from a group of devices that can generate the force, as opposed to receiving a force from a separate network. The source generator can then convert the force into a mechanical displacement, as discussed above.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 5-6, 8-9, 11-12, 19, 26-27, 37-39, 41-42, 45-47, and 54-55 are rejected under 35 U.S.C. 103(a) as being obvious in view of Herbert.

With respect to claim 5, Herbert discloses the device as recited in claim 4, as discussed above, and further, it would have been obvious to a person of ordinary skill in the arts to duplicate the electrical generator of claim 4 in order to create a plurality of movable arms connected in series. The motivation for doing so would have been to create a plurality of power sources connected in series, where the total output of the system is the cumulative voltage converted by the movable arms. See MPEP 2144.04, *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960), where the court held that mere duplication of parts has no patentable significance unless anew and unexpected result is produced. The device of claim 5 produces a similar result as a plurality of voltage converters connected in series.

With respect to claim 6, Herbert discloses the device as recited in claim 4, and further, it would have been obvious to a person of ordinary skill in the arts to duplicate the parts of claim 4 to have the electrical generator comprise a plurality of movable arms connected in parallel. The motivation for doing so would have been to create a plurality of power sources connected in parallel, where the total output of the system is the cumulative current converted by the movable arms. The device of claim 5 produces a similar result as a plurality of current converters connected in parallel.

With respect to claim 8, Herbert discloses the device as recited in claim 7, and further, it would have been obvious to duplicate the parts of claim 7 to have the electrical generator comprises a plurality of piezoelectric elements connected in series. The motivation for doing so would have been to sum the series outputs of the plurality of voltage sources.

With respect to claim 9, Herbert discloses the device as recited in claim 7, and further, it would have been obvious to duplicate the electrical generator of claim 7 in order to have the electrical generator comprise a plurality of piezoelectric elements connected in parallel. The motivation for doing so would have been to sum the parallel outputs of the plurality of current sources.

With respect to claim 11, Herbert discloses the device as recited in claim 10, as discussed above, and further discloses the Lorentz actuator receives the electrical power from a source that is selected from the group consisting of an ac source and a dc source. The Herbert device is an analog or digital electrical isolator (paragraph 50, lines 6-8). It would be obvious to a person skilled in the art that the source supplying the analog or digital input signals is also a dc or ac source.

With respect to claim 12, Herbert discloses the device as recited in claim 1, and further discloses the source is provided by the dc power source, wherein the source generator further comprises a switch in electrical communication with the source to deliver pulses of electricity to the movable arms. Herbert discloses the capacitor plates of the MEM system can accept analog and digital signals (paragraph 50). It would have been obvious to provide the device with a switch. The motivation for doing so would have been to pulse the dc input voltage in order to create the digital input signal.

With respect to claim 19, Herbert discloses the device as recited in claim 1, and further, it would have been obvious to duplicate the source generator of claim 1 in order to create the device comprising a plurality of source generators connected to a common electrical input. The motivation for doing so would have been to create a plurality of

mechanical displacement outputs. The plurality of source generators is analogous to a plurality of independent voltage converters.

With respect to claim 26, Herbert discloses the method as recited in claim 22, as discussed above, and further, it would have been obvious to duplicate the electrical generator in order to provide a plurality of *electrical generators* connected in series. The motivation for doing so would have been because summing a plurality of voltage sources (i.e. the outputs of the voltage converters) requires the sources to be arranged in series.

With respect to claim 27, Herbert discloses the method as recited in claim 22, and further, it would have been obvious to duplicate the electrical generator in order to provide a plurality of *electrical generators* connected in parallel. The motivation for doing so would have been to sum a plurality of parallel current converters.

With respect to claim 38, Herbert discloses the device as recited in claim 37, and further, it would have been obvious to duplicate the parts of the electrical generator in order to provide a plurality of movable arms connected in series. The motivation for doing so would have been to create a plurality of voltage sources connected in series, where the total output of the system is the cumulative voltage converted by the movable arms.

With respect to claim 39, Herbert discloses the device as recited in claim 37, and further, it would have been obvious to duplicate the parts of the electrical generator in order to provide a plurality of movable arms connected in parallel. The motivation for doing so would have been to create a plurality of current sources connected in parallel,

where the total output of the system is the cumulative current converted by the movable arms.

With respect to claim 41, Herbert discloses the device as recited in claim 40, and further, it would have been obvious to duplicate the parts of the electrical generator in order to provide a plurality of piezoelectric elements connected in series. The motivation for doing so would have been to sum the series outputs of the plurality of voltage sources.

With respect to claim 42, Herbert discloses the device as recited in claim 40, and further, it would have been obvious to duplicate the parts of the electrical generator in order to provide a plurality of piezoelectric elements connected in parallel. The motivation for doing so would have been to sum the parallel outputs of the plurality of current sources.

With respect to claim 45, Herbert discloses the device as recited in claim 44, and further discloses the Lorentz actuator receives the electrical power from a source that is selected from the group consisting of an ac source and a dc source. As discussed above, it would be obvious to a person skilled in the art that the Herbert source is a dc or ac source.

With respect to claim 46, Herbert discloses the device as recited in claim 45, and further discloses the source is provided by one of a piezoelectric actuator and a thermal actuator (paragraph 45, lines 5-8).

With respect to claim 47, Herbert discloses the device as recited in claim 45, and further discloses the source is provided by the dc power source, wherein the *first*

generator further comprises a switch in electrical communication with the source to deliver pulses of electricity to the movable arms. Herbert discloses the capacitor plates of the MEM system can accept analog and digital signals (paragraph 50). It would have been obvious to provide the device with a switch. The motivation for doing so would have been to pulse the dc input voltage in order to create the digital input signal.

With respect to claim 54, Herbert discloses the device as recited in claim 34, and further, it would have been obvious to duplicate the electrical generator of claim 34 in order to provide the device comprising an array of electrical generators connected in parallel. The motivation for doing so would have been to convert a plurality mechanical displacements to provide parallel electrical outputs.

With respect to claim 55, Herbert discloses the device as recited in claim 34, and further, it would have been obvious to duplicate the electrical generator of claim 34 in order to provide the device comprising an array of electrical generators connected in series. The motivation for doing to would have been to sum the plurality of mechanical displacements to provide a single cumulative electrical output.

12. Claims 13-17, 31-33, and 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mihailovich, in view of Herbert.

With respect to claim 13, Milhailovich discloses the device as recited in claim 1, and further discloses the source generator comprises an electrostatic generator having capacitor plates (figure 2, item Cd) including at least one movable plate (figure 2, item 26) that is in mechanical communication with the beam.

Mihailovich does not expressly disclose *a set of* capacitor plates.

Herbert discloses a set of capacitor plates (figure 2, items 36a and 36b; paragraph 47) with at least one movable plate.

Mihailovich and Herbert are analogous because they are from the same field of endeavor, namely micro-electromechanical systems (MEMS) for isolating an electrical signal.

At the time of the invention by application it would have been obvious to combine the single capacitor plate MEM isolator disclosed in Mihailovich with the set of capacitor plates disclosed in Herbert.

The motivation for doing so would have been to create a system containing more capacitors that is more responsive.

With respect to claim 14, Mihailovich, in view of Herbert, discloses the device as recited in claim 13, and further, Mihailovich discloses the capacitor plates receive electrical power from a source that is selected from the group consisting of: an ac source and a dc source (column 3, lines 10-12).

With respect to claim 15, Milhailovich, in view of Herbert, discloses the device as recited in claim 14, and further, Milhailovich discloses the electrostatic generator draws power from the dc power source.

Mihailovich does not expressly disclose the electrostatic generator further comprises a switch in electrical communication with the source to deliver pulses of electricity to the capacitor plates.

Herbert discloses the capacitor plates of the MEM system can accept analog and digital signals (paragraph 50, lines 6-8).

At the time of the invention by applicants, it would be obvious to a person of ordinary skill in the art to provide the device with a switch. The motivation for doing so would have been to pulse the dc input voltage in order to create the digital input signal.

With respect to claim 16, Mihailovich, in view of Herbert, discloses the device as recited in claim 13.

Herbert discloses the electrostatic generator receives a voltage input from a piezoelectric actuator (paragraph 45, lines 5-8, "piezoelectric motor"). Herbert discloses using various combinations of source generators and electrical generators.

It would have been obvious to a person of ordinary skill to combine the electrically isolated power transfer MEMS device disclosed in Mihailovich and the piezoelectric actuator disclosed in Herbert. Each of the Herbert source generators is electrically isolated from the Herbert electrical generators, and therefor, the selection of the source generator is independent from the electrical generator. Since the Herbert source generators may be interchanged, it would have been obvious to construct the device comprising a piezoelectric actuator.

With respect to claim 17, Mihailovich, in view of Herbert, discloses the device as recited in claim 13.

Herbert discloses that the electrostatic actuator receives a voltage input from a thermocouple (paragraph 45, lines 5-8, "thermal expansion motor"). As discussed

above, the Herbert source generators may be interchanged without changing or affecting the electrical generator.

With respect to claim 31, Milhailovich, in view of Herbert, discloses the apparatus necessary to complete the method recited in claim 31, as discussed in the rejection of claim 15, above.

With respect to claim 32, Milhailovich, in view of Herbert, discloses the apparatus necessary to complete the method recited in claim 32, as discussed in the rejection of claim 13, above.

With respect to claim 33, Mihailovich, in view of Herbert, discloses the method as recited in claim 32, and further, Herbert discloses that the electrical power is received via one of a piezoelectric actuator and a thermal actuator (paragraph 45, lines 5-8), as discussed above.

With respect to claim 48, Milhailovich discloses the device as recited in claim 34, and further discloses the source generator comprises an electrostatic generator having capacitor plates (figure 2, item Cd) including at least one movable plate (figure 2, item 26) that is in mechanical communication with the beam.

Mihailovich does not expressly disclose *a set* of capacitor plates.

Herbert discloses a set of capacitor plates (figure 2, items 36a and 36b; paragraph 47) with at least one movable plate, as discussed above.

With respect to claim 49, Mihailovich, in view of Herbert, discloses the device as recited in claim 48, and further, Mihailovich discloses the capacitor plates receive

electrical power from a source that is selected from the group consisting of: an ac source and a dc source (column 3, lines 10-12).

With respect to claim 50, Milhailovich, in view of Herbert, discloses the device as recited in claim 48, and further, Milhailovich discloses the electrostatic generator draws power from the dc power source.

Mihailovich does not expressly disclose the electrostatic generator further comprises a switch in electrical communication with the source to deliver pulses of electricity to the capacitor plates.

Herbert discloses the capacitor plates of the MEM system can accept analog and digital signals (paragraph 50, lines 6-8). It would be obvious to a person of ordinary skill in the art to provide the device with a switch. The motivation for doing so would have been to pulse the dc input voltage in order to create the digital input signal.

13. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mihailovich, in view of Ko (US 6,987,435).

Mihailovich discloses the device as recited in claim 1, but does not expressly disclose the power transfer structure includes a lever having a first end pivotally attached to the substrate and a second end opposite the first end, wherein the input end is disposed proximal the fist end, and wherein the output end is disposed proximal the second end.

Ko discloses power transfer structure includes a lever (figure 6b, item 25; column 4, lines 42-48) having a first end pivotally attached to the substrate (figure 6b, items 2

and 24). Further, according to the disclosure of Ko, the input end is disposed on the first (short) end of the lever, while the output is disposed on the second (long) end of the lever.

Milhailovich and Ko are analogous because they are from the same field of endeavor, namely micro-electromechanical actuators that provide mechanical displacements.

At the time of the invention by applicants, it would have been obvious to a person of ordinary skill in the art to combine the MEM transfer device disclosed in Mihailovich with the lever disclosed in Ko.

The motivation for doing so would have been to amplify the displacement of the power transfer structure.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Dummermuth (US 2001/0050618) discloses a MEMS device comprising using the movement of a small beam to generate an electric signal.

b. Kretschmann (US 2003/0020472) discloses a MEMS device comprising generating a mechanical movement by passing a current through a conductor suspended in a magnetic field, and then converting the mechanical movement back into an electric signal.

c. Noworolski (US 6,317,342) discloses a MEMS device that converts an electrical signal into a mechanical resonance comprising capacitor plates.

d. Turner (US 6,497,141) discloses a MEMS device comprising capacitive actuators that convert electrical signals into mechanical movement that is transferred through beams to be reconverted by capacitive actuators back into an electrical output signal.

e. Yao (US 6,348,788, US 6,466,005, and US 6,504,356) and (US 6,188,322 and US 6,411,214) disclose an apparatus and method for transmitting a current through a deflectable member disposed in a magnetic field to convert the signal into mechanical movement.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adi Amrany whose telephone number is (571) 272-0415. The examiner can normally be reached on weekdays, from 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571) 272-2800 x36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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AA

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